REMARKS/ARGUMENTS

Favorable reconsideration of this application is respectfully requested in view of the above amendments and the following remarks.

Claims 52-76 remain pending in this application. By this amendment, Claims 56 and 72 have been amended. Support for the amendments to Claims 56 and 72 is found, by way of non-limiting example, in the Specification page 6, lines 13-19. Accordingly, it is respectfully submitted that no new matter has been added. Claims 52-55, 59-71 and 74-76 stand withdrawn from consideration as directed to one or more non-elected inventions.

Withdrawn Claim 59 depends from independent Claim 56, and withdrawn Claim 74 depends from independent Claim 72. It is respectfully requested that upon allowance of either Claim 56 or Claim 72 that Claim 59 or Claim 74 be rejoined under the procedure of MPEP § 821.04.

In the outstanding Office Action, Claims 56-58 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Schell et al. (U.S. 5,952,110, hereinafter "Schell") in view of Koizumi et al. (EP 1035231 A1, hereinafter "Koizumi"); and Claims 72 and 73 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Schell in view of Koizumi and further in view of Kamo et al. (U.S. 4,738,227, hereinafter "Kamo") and Church et al. (U.S. 3,956,531, hereinafter "Church").

Applicants hereby express appreciation for the grant of a personal interview with the Examiner and supervisory patent Examiner on May 12, 2010. During the interview, the Examiners acknowledged that Schell does not describe depositing a composite layer by an electric spark machine process. They further indicated that they fail to see any differences between the claimed process and the electric spark alloying of Koizumi. They further indicated that clarification regarding the distinction between the electric spark machine as recited in the claims and the machine described by Koizumi should be made either by claim

amendment or the presentation of evidence such as a declaration. In response thereto, Claims 56 and 72 have been amended to clarify the differences from Koizumi.

Claim 56 recites "forming a protective coating on a portion of an untreated component by processing a portion as a workpiece of an electric spark machine with the tool electrode spaced from the component in an electrically insulating fluid." Claim 72 recites similar subject matter. It is respectfully submitted that these features are neither disclosed by nor rendered obvious by Schell, Koizumi or the combination thereof.

Schell describes "[a]n abrasive coating suitable for forming an abrasive blade tip of a gas turbine engine."[1] Schell states that "[p]referred materials for the abrasive particles 14 [sic – 16] are microcrystalline oxides."[2] Those particles are "incorporated into the alloy and ceramic layers 12 and 14 to abrade a ceramic shroud."[3] Schell indicates that the abrasive blade tip coating is formed by:

> 1. depositing an initial layer of the NiCrCoAl alloy;[4]
>
> 2. incorporating the abrasive particles 16 into the alloy layer 12 until a single layer of particles 16 is deposited;[5] and
>
> 3. depositing ceramic layer 14 by known plasma spraying or PVD techniques.[6]

Schell indicates that the preferred technique for depositing alloy layer 12 "is to electrodeposit the NiCrCoAl alloy, such as by use of the electroplating method disclosed in U.S. Pat. No. 4,789,411."[7] Furthermore, Schell indicates that "the abrasive particles 16 are preferably incorporated into the alloy layer 12 until a single layer of particles 16 is deposited as shown in FIG. 1."[8]

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[1] Abstract.
[2] Column 5, lines 26-27.
[3] Column 5, lines 30-33. See also FIG. 1.
[4] Column 5, lines 36-37.
[5] Column 5, lines 37-40.
[6] Column 5, lines 47-48.
[7] Column 5, lines 42-45.
[8] Column 5, lines 38-40.

The rejection reasoning fails to meet the "as a whole" requirement because the absence of detailed teachings is disregarded. For example, the limitation "*processing the portion as a workpiece of an electric spark machine and a tool electrode...*" to form coatings as commonly recited in independent Claims 56 and 72 is neither taught nor suggest by Schell or the other cited references. An electric spark machine is a well-known machine specialized for electric spark machining. Please see the following explanations made in "The McGraw-Hill Dictionary of Scientific and Technical Terms 5th edition":

> electric spark machining [MET] A process by which materials that conduct electricity can be removed from a metal by an electric spark; used to form holes of varied shapes in materials of poor machinability.

Although conventional electric spark machining uses electric spark for removing a surface part of the workpiece, in Claims 56 and 72 the subject electric spark is used to remove and throw a tip of an electrode toward a workpiece to form coatings thereon. The aforementioned limitation requires use of this method and therefore clearly differentiates the claimed subject from the references.

In contrast, Schell fails to describe use of an electric spark machine.

Instead Schell describes electroplating and further describes plasma spraying or PVD (physical vapor deposition) techniques[9] for formation of coatings. As to the plasma spraying, please see the following explanation in "McGraw-Hill". Apparently these methods must not use an electric spark machine. Therefore Schell fails to teach the aforementioned limitation.

McGraw-Hill states:

> plasma spraying [MET] In thermal sparing, melting and transference of a metal coating to a workpiece by use of a nontransferred arc.
>
> surface allowing [MET] Deposition and metallurgical bonding of additional metals or alloys on the surface of ferrous or

[9] See column 5, lines 47-48.

> nonferrous metals; such additional materials become an integral part of the total mass, as distinguished from coatings which are bonded mechanically.

Similar observations apply to the other references. For example, Koizumi describes electrospark alloying (ESA) for depositing coatings.[10] One skilled in the art field of electric spark machining would not be taught as to what constitutes the ESA, because Koizumi fails to describe details thereof and further these art fields are not nonanalogous and are out of Applicants field of endeavor. However, it appears that the ESA is a kind of surface alloying as listed in "McGraw-Hill" and uses a machine as that used for arc welding. More specifically, this method must not use an electric spark machine and therefore Koizumi fails to teach the aforementioned limitation.

It is noted that Koizumi EP 1035231 A1 refers to Figures 1 and 2 in paragraph [0011] thereof. However, the published copies of Koizumi do not appear to include these Figures. Therefore, for purposes of clarification a copy of Koizumi et al. U.S. 6,336,950 B1, which corresponds to Koizumi EP 1035231 A1 is attached. This U.S. Patent includes copies of FIGs. 1A, 1B and 2. These Figures are described in Koizumi EP 1035231 A1 paragraph [0043]. Therein, Koizumi describes:

> As schematically shown in Fig. 2, the work 6 was fixed with a clamp 4, 5 to a work table 7, and a coding 10 was deposited manually on the work 6 surface, with an electrode rod 8 supported in a holder 9. An Elitron-52B type power supply (not shown) was used for the electro spark deposition.

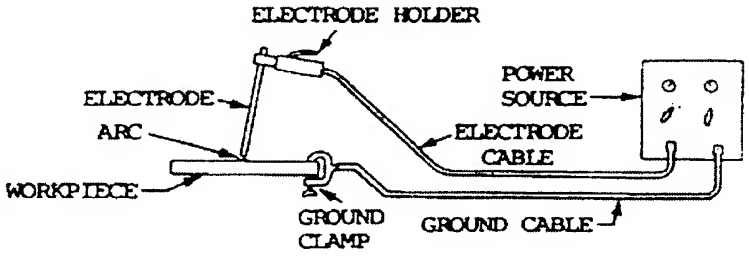
As shown in Koizumi FIG. 2, rod 8 is in physical contact with work 6. Thus, the structure of Koizumi is similar to welding.

It is submitted that FIG. 2 of Koizumi is in marked contrast with an electric spark machine as exemplified in Fig. 3 of the current application. Moreover FIG. 2 appears very

[10] See paragraph [0002].

similar to a shielded meal arc welding device. Please see any schematic drawing such as those available in Wikipedia "Shielded Metal Arc Welding" for example (see below).

Apparently, the ESA is within an art field close to welding and therefore nonanalogous to the present invention.



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Koizumi, for example in the paragraphs 0002 and 0030 of EP 1035231, describes that the ESA machine requires generation of intense and instantaneous temperatures of 3000 to 4000 degrees C to melt metals of an electrode to provide liquid phase thereof. Thus the ESA machine inherently leaves a heat-affected structure in a workpiece. In contrast, deposition by an electric spark machine as claimed does not throw such great power into a workpiece. In fact, a part of an electrode thrown toward the workpiece may still remain solid in part and then form a coating Thus the electric spark machine as claimed does not result in a considerably heat-affect structure. More specifically, albeit the claims recite a method, recitations therein include structures with less heat influences.

Therefore, Koizumi fails to describe or render obvious the features of Claims 56 and 72 described above including processing the portion of the component as a workpiece of an electric spark machine with the tool electrode spaced from the component in an electrically insulating fluid.

No teaching, suggestion, motivation or other logical reason to change a deposition method of Schell or Koizumi into a method carried out by an electric spark machine can be

found in the cited references. Therefore the claimed subject is submitted to be unobvious over the cited references.

Further in regard to Claim 72, the references fail to teach or suggest "closing pores of the protective coating by filling a powder of SiO_2 or $MoSi_2$ into the pores and heating the portion enough to change the powered into amorphous SiO_2".

The Office Action asserts that Kamo teaches a similar step. However Kamo teaches zirconia plasma spraying as the Office Action recognizes.

No motivation or suggestion to substitute "filling a powder of SiO_2 or $MoSi_2$ into the pores" for the zirconia plasma spraing can be found because one skilled in the art would know that "filling" is too rough to make a through covering and therefore expect insufficiency or poor closure unless plasma spraying is used. Contrary to such an expectation, amorphous $Si0_2$ changed from SiO_2 or $MoSi_2$ provides sufficient pore closure because of its moderate fluidity at high temperatures. The combination of porous protective coating and "filling a powder of SiO_2 or $MoSi_2$ into the pores" provides such an unexpected result.

It is respectfully submitted that dependent Claims 57, 58 and 73 are patentable at least for the reasons argued above with regard to Claims 56 and 72 from which they depend.

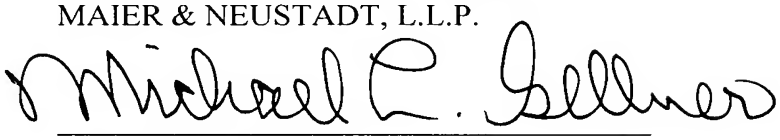
Accordingly, it is respectfully requested that the rejections of Claims 56-58, 72 and 73 be reconsidered and withdrawn, and that Claims 56-59 and 72-74 be passed to allowance.

Consequently, for the reasons discussed in detail above, no further issues are believed to be outstanding in the present application and the present application is believed to be in condition for formal allowance. Therefore, a Notice of Allowance is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact the undersigned representative at the below-listed telephone number.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, L.L.P.



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